Holmes (Ed. W.)

Refrigeration as a Means of Preservation of Bodies for Use in the Dissecting-Room.

By EDMUND W. HOLMES, A. B., M. D.,

Demonstrator of Anatomy at the University of Pennsylvania.

[Reprinted from International Medical Magazine, Dec., 1897.]

LIBRARY
SURGEON GENERAL'S OFFICE
AUG.-30-1898
608

WITH THE COMPLIMENTS
OF THE AUTHOR

LIBRARY
SURGEON GENERAL'S OFFICE
AUG.-30-1898
608.

REFRIGERATION AS A MEANS OF PRESERVATION OF BODIES FOR USE IN THE DISSECTING-ROOM.

BY EDMUND W. HOLMES, A.B., M.D.,
Demonstrator of Anatomy at the University of Pennsylvania.

THE importance of the dissecting-room as a means of medical education has always been recognized in theory in every medical school, but the collateral branches and the prominence given to the merely didactic methods have too often crowded it into a dark and dismal corner, "out of sight and out of mind." With the increasing influence of the clinical methods, bedside teaching will go hand in hand with personal instruction upon the cadaver, so that the supply of bodies and their preservation will become more and more a question of moment, as the classes become larger, more strict supervision is exercised, and a higher grade of work is required.

A recent journal remarks that at Cambridge, England, the study of anatomy is seriously embarrassed by the scarcity of material; likewise the prejudice in our own communities makes it exceedingly difficult to enforce strictly the anatomical laws under which our supplies of bodies are obtained; so that it behooves each institution to preserve with the utmost care the material apportioned to it. The older methods of immersion in alcohol or brine were inadequate, and responsible in a degree for the antipathy to dissection among the students themselves. The more the work becomes systematized the more evident this becomes, because, while under a careless *régime* the student simply shirked and was glad of the excuse, with enforced dissection the objection is quickly and more forcibly emphasized.

Refrigeration, recently introduced at the University of Pennsylvania, has, in one form or another, been tried in a number of our schools. It requires for its success much greater care, and consequently exacts harder work and more time from the attendants in the dissecting-room.

It is a mistake to suppose that anybody can inject, and that any body can be injected in twenty minutes. Considering the scarcity and the actual cost of cadavera and that they cannot be replaced at any price, there is no branch so misunderstood and no work so undervalued. A good embalmer is a most valuable adjunct to any medical school, and such a one versed in the preparation of the various preservative solutions and of the different coloring masses, and their proper and thorough injection, would, if properly appreciated, command a handsome salary. In some of our schools the waste of dissecting material is hardly less than shameful.

At the University of Pennsylvania the bodies as soon as received are thoroughly cleansed, the hair shaven from the scalp and about the pubes, and the body injected by both femorals with equal parts of alcohol, glycerin, and carbolic acid. A fifty per cent. solution of zinc chloride is used when decomposition has already set in. To avert advanced putrefactive changes zinc chloride is by far the most valuable agent. Formalin has been tried to a limited extent, but has not given satisfaction. It has little penetrating power, doubtless because it hardens the tissues with which it comes in contact, and its solutions evaporate rapidly, a mould forming upon the exposed surfaces. It therefore can be employed only in cases where the dissections when not in use are kept completely immersed. On account of the indurating effect, weak solutions (two per cent.) may be preferable to the stronger (ten per cent.).

The injection is done by compressed air (Fig. 1), one to five pounds pressure being ample, a T being used so as to throw the fluid in both directions at the same time. The body is then suspended, by tongs in the ears, for twenty-four hours, so as to insure thorough infiltration of the legs and feet, the most difficult parts to preserve; after which the color mass, of which starch or glue is preferable to the preparations of plaster of Paris, is thrown in. A few hours having been allowed for this mass to harden, the body is thoroughly dried, anointed with petrolatum, wrapped in tissue paper, in turn covered with muslin rollers, and then placed in the refrigerating room.

The box is of sufficiently simple construction. It consists of a light sheathing of yellow pine upon which is tacked thick rosin paper, then there is another layer of sheathing, next another of paper, and then sheathing again, after which a space four inches wide is filled with "crumbs of cork," and the sheathings of wood and rosin paper are repeated, making the whole wall about seven inches thick (Fig. 2). In the interior are three rows of shelves which afford room for about 115 bodies, but doub e that number can be accommodated if necessary. The alcoves are lettered and numbered, and each body has its tin tag upon it, so that if reclaimed it can readily be found. The ammonia process is used. The refrigerating plant is run by a dynamo controlled from the central light and heat station. The pipes are placed overhead, while on either side is a tank for brine, reservoirs of cold, which will keep the box at a low temperature for several hours

in case of a break-down in the machinery. During the winter months it is only necessary to run the dynamo about six hours, at night. A registering thermometer indicates the diurnal variations of temperature, the average being about 20° F.

The advantages of this method of preservation are: the thorough cleanliness, which is imperative; the fact that the bodies are always under supervision when in storage; the anointing of the skin, which renders it pliable and easy to dissect; while, if properly injected with preservatives, the bodies keep well upon the dissecting tables. The slimy appearance of cadavera packed in ice and salt, the water logged condition of those soaked in brine, and the hardening of those immersed in alcohol are avoided.

With proper injecting apparatus, a skilled injector, a modern refrigerating plant, the recognition of the need of bedside methods in the dissecting-room, and the insistence upon personal dissecting and demonstration rather than a main dependence upon the lecture and the quiz, it is hoped that the medical schools may turn out students competent to practise medicine and surgery, rather than glib automatons to pass examinations.

The successful medical schools of the near future will be those having the largest supply of clinical material, the best-equipped laboratories, and affording the most direct personal, individual instruction.

REFRIGERATING APPARATUS USED BY THE DEPARTMENT OF ANATOMY AT THE UNIVERSITY OF PENNSYLVANIA.

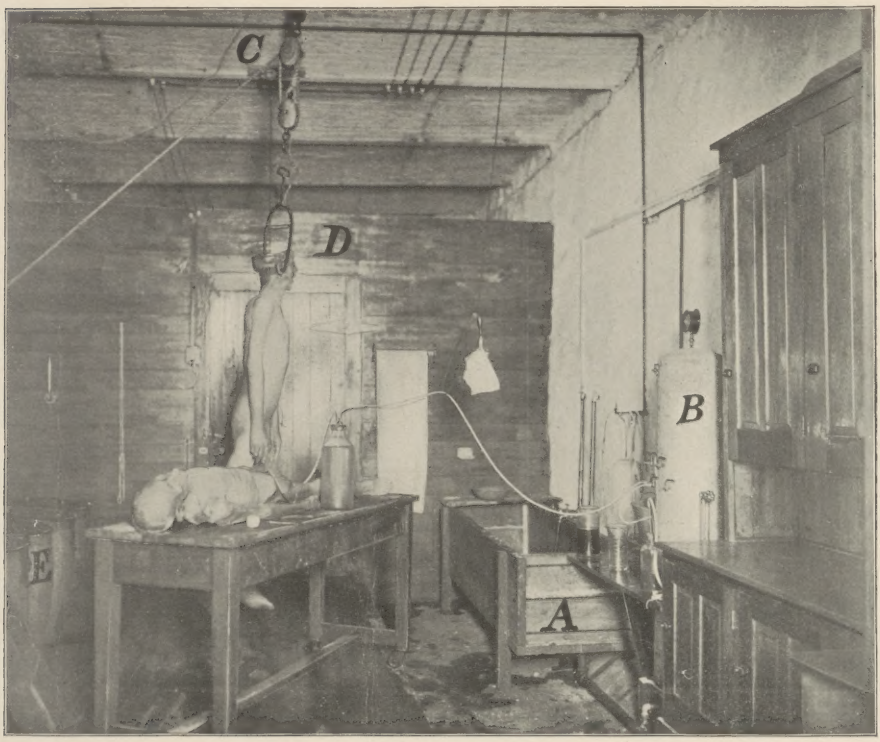

FIG. 1.—*A*, bath; *B*, air-condenser and injecting apparatus; *C*, pulley suspension apparatus; *D*, exterior of refrigerating box; *E*, odorless excavator barrels.

FIG. 2.—*A*, recording thermometer and middle tier of shelving; *B*, tiers of shelving, south side; *C*, brine tank; *D*, tiers of shelving, north side; *E*, pipes of refrigerating apparatus.